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10/023,137	12/17/2001	Nathan D. Cahill	83512THC	4712

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EXAMINER

YODER III, CHRISS S

ART UNIT

PAPER NUMBER

2612

DATE MAILED: 06/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/023,137

Applicant(s)

CAHILL ET AL.

Examiner

Chriss S. Yoder, III

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 March 2005 and 11 April 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13, 15 and 17-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13, 15, 17, and 19-20 is/are rejected.
- 7) ☒ Claim(s) 18 and 21 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 April 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Response to Arguments

Applicant's arguments filed March 7, 2005 have been fully considered but they are not persuasive.

Applicant argues, with respect to claim 1, in particular the limitation that was previously in now canceled claim 14, of "determining the focal length of the source digital images by analyzing the exposure falloff in at least one overlapping region of said source digital images", that the official notice does not relate to a step of determining focal length, but rather to computing the radial exposure transform from the determined focal length. However, the examiner points out that in order for the radial transform to be computed using the determined focal length, then the focal length is inherently determined before computing the radial transform.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

1. Claims 1-10, 13, 15, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Diepstraten (US Patent # 5,602,896).

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2. In regard to claim 1, note Diepstraten discloses the use of a method for producing a composite digital image, comprising the steps of providing a plurality of partially overlapping source digital images having pixel values that are linearly or logarithmically related to scene intensity (column 6, lines 34-44), computing a radial exposure transform to compensate for exposure fall off as a function of the distance of a pixel from the center of the digital image (column 8, lines 25-29; the images are compensated for vignetting), modifying the source digital images by applying a radial exposure transform to one or more of the source digital images to produce adjusted source digital images (column 8, lines 25-29; the images are compensated for vignetting), and combining the adjusted source digital images to form a composite digital image (column 9, lines 56-58). Therefore, it can be seen that the Diepstraten device lacks the step of determining the focal length of the source digital images by analyzing the exposure falloff in at least one overlapping region of said source digital images. Official notice is taken that the concepts and advantages of using the focal length to calculate the radial exposure transform are notoriously well known and expected in the art. Therefore, it would have been obvious to one of ordinary skill in the art to modify the Diepstraten device to include the use of the focal length to calculate the radial transform in order to compensate for falloff caused by the lens system.

3. In regard to claim 2, note Diepstraten discloses the use of a step of applying a linear exposure transform to one or more of the source digital images prior to combining the adjusted source digital images to produce adjusted source digital images having pixel values that closely match in an overlapping region (column 6, lines 40-45; the

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images are compensated based on the differences between the images in order to match the two and composite them together).

4. In regard to claim 3, note Diepstraten discloses the use of a method for producing a composite digital image as claimed in claim 1. Therefore, it can be seen that the Diepstraten reference fails to disclose that the radial exposure transform includes a \cos^4 dependence on the distance from the center of the image. Official notice is taken that the concepts and advantages of using a transform to compensate for falloff using the \cos^4 law of illumination falloff is notoriously well known and expected in the art. Therefore, it would have been obvious to one of ordinary skill in the art to modify the Diepstraten device to include the use of a radial exposure transform includes a \cos^4 dependence on the distance from the center of the image in order to correctly compensate for image falloff.

5. In regard to claim 4, note Diepstraten discloses that the step of providing source digital images further comprises the step of applying a metric transform to a source digital image such that the pixel values of the transformed source digital image are linearly or logarithmically related to scene intensity (column 6, lines 40-45; the images are compensated based on the differences between the images in order to match the two and composite them together).

6. In regard to claim 5, note Diepstraten discloses that the metric transform is a scene independent transform (column 7, lines 20-22; it is considered to be scene independent because the gain factors can be fetched from a memory instead of basing the factors on the image).

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7. In regard to claim 6, note Diepstraten discloses that the combining step includes calculating an average of the pixel values in the overlapping region (column 7, lines 42-61; the average of the columns that are going to be composited next to each other are averaged and corrected).

8. In regard to claim 7, note Diepstraten discloses the output of the digital image to a display device (column 6, lines 44-48; and figure 1:22) and in order for the image to be viewed, it is inherently transformed into an output device compatible color space.

9. In regard to claim 8, note Diepstraten discloses the use of a method for producing a composite digital image as claimed in claim 4. Therefore, it can be seen that the Diepstraten reference fails to disclose that the metric transform includes a color transformation matrix. Official notice is taken that the use of a color transformation matrix is notoriously well known and expected in the art. Therefore, it would have been obvious to one of ordinary skill in the art to modify the Diepstraten device to include the use of a color transform matrix to correct for problems such as white balance.

10. In regard to claim 9, note Diepstraten discloses that the metric transform includes a lookup table (column 7, lines 20-22; the gain factors can be fetched from a memory).

11. In regard to claim 10, note Diepstraten discloses the use of a method for producing a composite digital image as claimed in claim 4. Therefore, it can be seen that the Diepstraten reference fails to disclose that the metric transform is included as metadata with the corresponding source digital image. Official notice is taken that the concepts and advantages of storing information pertaining to the image as metadata is notoriously well known and expected in the art. Therefore, it would have been obvious

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to one of ordinary skill in the art to modify the Diepstraten device to include the storage of the metric transform as metadata in order to store the associated data together for better organization as well as to keep related data together in instances such as data transfer from one device to another.

12. In regard to claim 13, note Diepstraten discloses the use of a method for producing a composite digital image as claimed in claim 1. Therefore, it can be seen that the Diepstraten reference fails to disclose the use of metadata stored with the image to store the radial transform. Official notice is taken that the concepts and advantages of storing additional image parameters and camera settings as metadata are notoriously well known and expected in the art. Therefore, it would have been obvious to one of ordinary skill in the art to modify the Diepstraten device to include the use of metadata to store the radial transform in order to store the associated data together for better organization as well as to keep related data together in instances such as data transfer from one device to another.

13. In regard to claim 15, note Diepstraten discloses the use of a method for producing a composite digital image as claimed in claim 1. Therefore, it can be seen that the Diepstraten reference fails to disclose that the radial exposure transform is not calculated using a flash indicator. Official notice is taken that the concepts and advantages of using a flash indicator to calculate the radial exposure transform are notoriously well known and expected in the art. Therefore, it would have been obvious to one of ordinary skill in the art to modify the Diepstraten device to include the use of a flash indicator to calculate the radial transform in order to compensate for flash falloff.

14. In regard to claim 17, note Diepstraten discloses the use of a method for producing a composite digital image as claimed in claim 1. Therefore, it can be seen that the Diepstraten reference fails to disclose the use of a computer program product comprising computer readable storage medium having a computer program stored thereon for performing the method of claim 1. However, it would have been obvious to one of ordinary skill in the art to modify the Diepstraten device to use a computer program to perform the method of claim 1 in order to implement the method in any type of imaging device or in a computer after the images are transferred from the camera. Therefore, it would have been obvious to one of ordinary skill in the art to modify the Diepstraten in to include the use of a computer program in order to implement the method in any imaging device.

15. In regard to claim 19-20, these are apparatus claims, corresponding to the method of claims 1-2. Therefore, claims 19-20 have been analyzed and rejected as previously discussed with respect claims 1-2.

16. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Diepstraten (US Patent # 5,602,896) in view of Inoue et al. (US Patent # 5,083,209).

17. In regard to claim 11, note Diepstraten discloses the use of a method for producing a composite digital image as claimed in claim 2. Therefore, it can be seen that the Diepstraten reference fails to disclose that the linear exposure transform is a function of the shutter speed used to capture the source digital image, and that the shutter speed is included as meta-data with the corresponding source digital image.

Inoue discloses the use of an exposure transform that is a function of the shutter speed used to capture the image (column 2, lines 9-12; and column 3, lines 7-16; the brightness is adjusted based on a function of shutter speed; the shutter speed is changed to obtain the desired brightness). Inoue teaches that the use of a transform that is a function of shutter speed is preferred in order to obtain the desired brightness values of the image (column 2, lines 9-12). Therefore, it would have been obvious to one of ordinary skill in the art to modify the Diepstraten device to include the use of a transform that is a function of shutter speed as suggested by Inoue.

Official notice is taken that the concepts and advantages of storing additional image parameters and camera settings as metadata are notoriously well known and expected in the art. Therefore, it would have been obvious to one of ordinary skill in the art to modify the Diepstraten device to include the use of metadata to store the shutter speed in order to store the associated data together for better organization as well as to keep related information together for instances such as data transfer from one device to another.

18. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Diepstraten (US Patent # 5,602,896) in view of Hirai et al. (US Patent #6,603,928).

19. In regard to claim 12, note Diepstraten discloses the use of a method for producing a composite digital image as claimed in claim 2. Therefore, it can be seen that the Diepstraten reference fails to disclose that the linear exposure transform is a function of the f-number used to capture the source digital image and that the f-number is included as meta-data with the corresponding source digital image.

Hirai discloses the use of an exposure transform that is a function of the f-number used to capture the image (column 2, lines 10-25; and column 3, lines 16-17; the f-number is used to compensate the image). Hirai teaches that the use of a transform that is a function of the f-number is preferred in order to correct image coloring to a desired value (column 2, lines 10-30). Therefore, it would have been obvious to one of ordinary skill in the art to modify the Diepstraten device to include the use of a transform that is a function of the f-number as suggested by Hirai.

Official notice is taken that the concepts and advantages of storing additional image parameters and camera settings as metadata are notoriously well known and expected in the art. Therefore, it would have been obvious to one of ordinary skill in the art to modify the Diepstraten device to include the use of metadata to store the shutter speed in order to store the associated data together for better organization as well as to keep related information together for instances such as data transfer from one device to another.

Allowable Subject Matter

20. Claims 18 and 21 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

21. As for claims 18, the prior art does not teach or fairly suggest the use of a method for producing a composite digital image using the root of the function:

$$g(r) = I_0'' \cos^4 \left(\tan^{-1} \left(r^{-1} \sqrt{u_1^2 + v_1^2} \right) \right) - I_1' \cos^4 \left(\tan^{-1} \left(r^{-1} \sqrt{x_1^2 + y_1^2} \right) \right)$$

to calculate the focal length of the overlapping regions.

22. As for claims 21, the prior art does not teach or fairly suggest the use of a system for producing a composite digital image using the root of the function:

$$g(r) = I_0'' \cos^4 \left(\tan^{-1} \left(r^{-1} \sqrt{u_1^2 + v_1^2} \right) \right) - I_1' \cos^4 \left(\tan^{-1} \left(r^{-1} \sqrt{x_1^2 + y_1^2} \right) \right)$$

to calculate the focal length of the overlapping regions.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.


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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chriss S. Yoder, III whose telephone number is (571) 272-7323. The examiner can normally be reached on M-F: 8 - 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wendy Garber can be reached on (571) 272-7308. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CSY
June 24, 2005


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